

Docket No. 5057

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of: HERBERT

Serial No. 09/931160

Filed: August 17, 2001

Title: ITEM HANDLING SYSTEM

PRIORITY DOCUMENTAssistant Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

Transmitted herewith is a certified copy of European Application No. 0020268.9,
filed 18 August 2000, priority of which is hereby claimed under 35 U.S.C. §119.

Respectfully submitted,

Charles W. Fallow
Reg. No. 28,946

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September 11, 2001



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I also certify that the attached copy of the request for grant of a Patent (Form 1/77) bears an amendment, effected by this office, following a request by the applicant and agreed to by the Comptroller-General.

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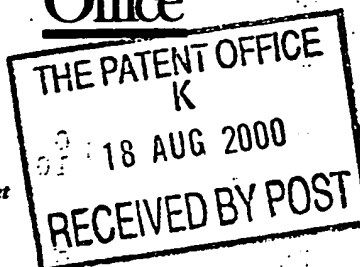
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Dated 24th August 2001

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18 AUG 2000

1. Your reference

13418/16941

2. Patent application number

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0020268.9

3. Full name, address and postcode of the or of each applicant (underline all surnames)

NEOPOST LIMITED
South Street
Romford
Essex, RM1 2AR

Patents ADP number (if you know it) 611 7667002

If the applicant is a corporate body, give the country/state of its incorporation

United Kingdom

4. Title of the invention

CONTROL OF QUALITY OF PRINTING

5. Name of your agent (if you have one)

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

HUGHES CLARK & CO

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53 High Street
Horsley
Surrey RH6 7BN

Patents ADP number (if you know it)

8770084

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Country

Priority application number
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Date of filing
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Date of filing
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Request for preliminary examination and search (Patents Form 9/77)

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(Patents Form 10/77)

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11.

I/We request the grant of a patent on the basis of this application.

Signature

Hughes Clark & Co

Date

HUGHES CLARK & CO 17 August 2000

12. Name and daytime telephone number of person to contact in the United Kingdom

0171 404 5414

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CONTROL OF QUALITY OF PRINTING.

This invention relates to printing, for example printing of postal indicia on mail items evidencing payment of postal charges in respect of the mail items and to the
5 control of the quality of the imprint.

Mail items for which postal charges are metered by postage metering apparatus receive an imprint of a postal indicium from the postage metering apparatus to provide evidence
10 that accounting has been effected in respect of the postage charge for the mail item. Known postage metering apparatus has been arranged to print a relatively simple form of indicium comprising a graphical pattern and items of postal information. The postal information usually
15 comprises an identification of the postage metering apparatus, an identification of a postal depot receiving the mail items from the mailer, the postage charge and the date the mail item is placed in the mail handling system. This relatively simple form of postal indicium has enabled
20 a visual check to be made of mail items to determine that postage charges therefor have been accounted for by the postage metering apparatus. Since the printed postal indicia were only subjected to a visual check, the quality of printing of the indicia was not critical provided that
25 the quality of the printing was sufficient to enable Postal Authority personnel to determine that an imprint had been applied and to read the amount of the postage charge to determine that the correct postal charge for the item had been applied.

30

However with the advent of use of digital printing techniques for printing postal indicia and with a desire to provide security against fraudulent imprints of postal indicia, it is now proposed to print additional
35 information in the postal indicia which includes cryptographic information that can be used to verify authenticity of the printed postal indicia and to automate

the reading of the information in the printed indicia and the verification of the indicia. Accordingly it becomes necessary that the quality of printing of the postal indicia is maintained sufficiently high as to ensure
5 successful machine reading of the information in the printed postal indicia. Mail handling authorities and operators seek to achieve 100% readability of postal indicia printed on mail items. However changes may occur in the printing of the postal indicia that result in the
10 machine reading apparatus being incapable of unambiguously reading the information in the imprint on every mail item. Changes that affect the machine readability of printed postal indicia may not be evident to and may not be noticed by a human operator of postage metering apparatus.

15 Various factors may affect quality of printing of the postal indicia and hence affect the machine readability of the indicia. One factor is a restricted supply of ink for forming an imprint on mail items for example due to a low
20 level of ink in an ink supply to the printer. For example, if an ink jet printer is used in the postage metering apparatus to print the indicia, after substantial use of an ink jet print cartridge the ink supply to the ink jet nozzles may be so depleted as to result in poor
25 quality printing of the indicia or nozzles of the ink jet print head may become partially or totally blocked so that dots required to print the indicia are only partially formed or are wholly absent. Ink jet cartridges may be improperly installed in the postage metering apparatus by
30 the operator resulting in poor electrical connections to the cartridge or even lack of connection to some of the electrical terminals of the cartridge. As a result some of the ink jet nozzles may not be operative. Improper installation of the cartridge may also result in
35 misalignment of the nozzles of the print head so that printed dots forming the indicia imprint are misaligned and the indicia imprint is distorted. The quality of

printing is also dependent upon the use of envelopes formed of a material suited to the particular method or technology used in printing the indicia. It will be appreciated that while all of these factors are under the control of a human operator and can be corrected by the human operator, a quality of printing that results in a machine readability of the printed indicia significantly lower than desired may not be clearly evident to the human operator.

10

According to a first aspect of the invention a preparation and article system includes a preparation station operable to print machine readable symbols on articles; an article handling station for receiving articles from the preparation station and operable to machine read and process information contained in the symbol printed on the articles; said article handling station including means to generate a message relating to readability of the symbols printed on a batch of said articles and to transmit said message to the preparation station; and said preparation station including means operative in response to said message to display an indication of readability of the symbols printed on the articles of the batch of articles received by the article handling system.

25

According to a second aspect of the invention a mail preparation and handling system includes a mail preparation station operable to print machine readable symbols on mail items, said symbols containing information relating to the mail item in which the respective symbols are printed; a mail handling station for receiving mail from the mail preparation station and operable to machine read and process information contained in the symbol printed on the mail pieces; said mail handling station including means to generate a message relating to readability of the symbols printed on a batch of mail items and to transmit said message to the mail preparation

35

station; and said mail preparation station including means operative in response to said message to display an indication of readability of the symbols printed on mail items of the batch of mail received by the mail handling
5 system.

An embodiment of the invention will now be described by way of example with reference to the drawings in which:-
Figure 1 illustrates a part of a mail item bearing an
10 imprint of a postal indicium, and
Figure 2 is a diagram illustrating operation of a mail preparation and handling system in accordance with the invention.

15 Referring first to Figure 1, a postal indicium 10 printed on a mail item 11 is of a form authorised by the postal authority and includes a graphic design 12 incorporating a designation of the appropriate postal authority and postal data. In the example illustrated the postal authority is
20 Royal Mail. The postal data is printed in human visually readable form and includes data items 13 comprising identification of the supplier of postage metering apparatus used to print the indicium, an identification serial number of the postage metering apparatus, an
25 identification of a batch of mail items and an item number for the mail item. The postal data also includes postal data items comprising class of mail 14, a date 15 of posting for the mail item and a postage charge 16 applied to the mail item.

30 In addition to the postal data printed in human visually readable form, the postal data is also included in a 2D symbol 17 printed in machine readable form.

35 The postal indicium also includes cryptographic data, for example a digital signature or encryption of postal data, to enable authenticity of the printed postal indicium to

be verified by a verification system operated by the postal authority. The cryptographic data is not required to be human visually readable and hence is included only in the printed machine readable 2D symbol 17. The parts
5 of the indicium, other than the symbol 17, are intended to be humanly visually readable and the print quality of these parts can be determined by visual inspection. However the 2D symbol 17 is intended for automatic machine reading. A determination as to whether the quality of
10 printing of the area 17 is sufficient to enable a required level of machine readability to be attained cannot be made by visual inspection.

The operation of a mail preparation and handling system is
15 illustrated in Figure 2. Mail items to be handled by a postal authority are prepared at a mail preparation station 20. In the preparation of mail items for handling by a mail authority, postage charges for the mail items are determined and accounting operations in respect of the
20 postal charges determined to be applied to each respective mail item are carried out. An indicium 10 unique to each mail item, as illustrated in Figure 1, is created for each mail item and is printed 21 on the corresponding mail item 11.

25

One or more messages 22 relating to a batch of mail items are sent from the mail preparation station 20 to a postal authority centre 23 for mail handling station and response messages 24 are sent from the postal authority centre 23
30 to the mail preparation station 20. The messages 22 provide information to the postal authority relating to batches of mail that have been prepared and are ready for handling by the postal authority and relating to batches of mail that are in the course of preparation but not yet
35 completed. The actual batches of mail items are transported 25 from the mail preparation station to the postal authority centre for reception into a mail handling

system operated by the postal authority. The response messages 23 from the postal authority to the mail preparation station acknowledge receipt of the messages 22 and also relate to the receipt and acceptance of the actual batches of mail. Our earlier filed GB application 0013152.4 (case 13299) relates to mail preparation and to acceptance of prepared mail by the postal authority and contains more detailed description relating to the messages 22 and response messages 24. That application also contains description relating to a display for indication of the status of the messages and response messages. The disclosure of said earlier application is hereby incorporated into and forms a part of the disclosure of this present application.

When a batch of mail is received at the postal authority centre and is entered into the mail handling system, the postal indicia on the items of the batch of mail are machine read 26 to obtain the postal data and other information contained in the 2D symbol and relating to the mail item. In addition to obtaining the postal data and other information by machine reading the 2D symbol, the postal data is verified using the cryptographic information read from the indicium.

If the quality of printing of the indicia on the mail items is sufficiently high, the machine reader will be capable of reading all of the machine readable information printed in 2D or datamatrix format in the 2D symbol 17. However if the quality of printing is not sufficiently high, the machine reader may be incapable of correctly reading all of the machine readable information included in the symbol 17.

The machine reading equipment for reading the symbol 17 makes use of a number of algorithms to read and process information read from the symbol 17. The information

included in the symbol 17 includes error correction bits but if the symbol has been printed perfectly the reading and processing of the information does not require reference to the error correction bits. If however the
5 symbol has not been printed perfectly, for example a part or parts of the symbol are missing, damaged or otherwise imperfect, the reading and processing of the information may make reference to the error correction bits in an attempt to overcome errors in reading information from
10 imperfect parts of the symbol.

Imperfections in the printed symbol may arise due a number of different factors, as has been discussed hereinbefore, including an insufficient supply of ink to the printer,
15 partially or wholly blocked ink jet print nozzles of an ink jet printer, improper installation of a printer cartridge and use of envelopes formed of material unsuitable to printing method or technology. All of these factors are within the control of an operator of the mail
20 preparation station and hence if any one or more of the factors result in printing of defective symbols on the mail items, the operator can make corrections to ensure that the symbol is printed with a sufficiently high quality to enable the machine reading equipment at the
25 postal authority station to attain a required level of reading of the information contained in the symbols. However as discussed hereinbefore imperfections in printing of the symbol that result in a lower than desired level of readability of the printed symbols is not likely
30 to be clearly evident to the operator.

Therefore the reading equipment is provided with means that uses the output of one or more of the algorithms, used in reading and processing the information included in
35 the printed 2D symbol, to provide information relating to the readability of the printed symbol on mail items received into the mail handling system of the postal

authority station. The information relating to readability of symbols printed on mail items of a batch of mail items is formatted to create a readability message 27 and is sent by the postal authority centre to the mail preparation station. The mail preparation apparatus at the mail preparation station is operative in response to receipt of the readability message 27 to display 28 to the operator information indicative of the level of readability of the printed symbols in a batch of mail received by the postal authority system from that mail preparation station.

In our earlier filed GB application 0013152.4 (case 13299), there is described a message status display a horizontal strip of the display is allocated to a batch of mail and areas in the strip are allocated to each message. The colour of an area provides an indication of the status of a message and as the status of the corresponding message changes the colour of the area is changed to indicate a new current status of the message. The readability message relating to a batch of mail may be allocated an area in the display separate from other messages and the area may be arranged to display a colour indicative of the readability of the printed symbols or to display a numeral indicative of the readability of the printed symbols. Thus the operator of the mail preparation equipment is made aware by the display corresponding to the readability message of whether or not a required level of reading of the printed symbols has been attained in respect of each batch of mail. When the display indicates that the required level of reading is not being attained the operator is alerted to investigate the reason for the printed symbols not being read to the required level and where possible to corrective action.

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The readability message may be a message separate from other response messages or the readability information may

be included in response message relating to acceptance of a batch of mail by the postal authority. The indication on the display of readability of the printed symbols may be separate from display of status information relating to other response messages or the readability information may be displayed as part of the display of information relating to status of a response message.

The readability message may contain readability information that has a range of values, for example 1 to 10, providing an indication of the readability of the machine readable information. The message may also contain information indicative of the number of items in a batch for which the machine readable imprint has a readability falling within each value in the range of readability. For example the message may indicate that 50 items have an imprint having a readability of value 5 and 1000 items have an imprint having a readability of value 7.

As described hereinbefore postal indicia including machine readable symbols are printed on the mail items. However if desired the machine readable information may be printed in the form of optical character recognition (OCR) characters.

If desired, the mail preparation equipment may be operative in response to receipt of a readability message indicating that the readability of the printed symbols is lower than a predetermined level, to inhibit further operation of the printer until the operator has carried out the required corrections to ensure that a required level of readability is attained.

It will be appreciated that the utilisation of the machine reading equipment that is used to read and process information contained in the printed symbol to determine

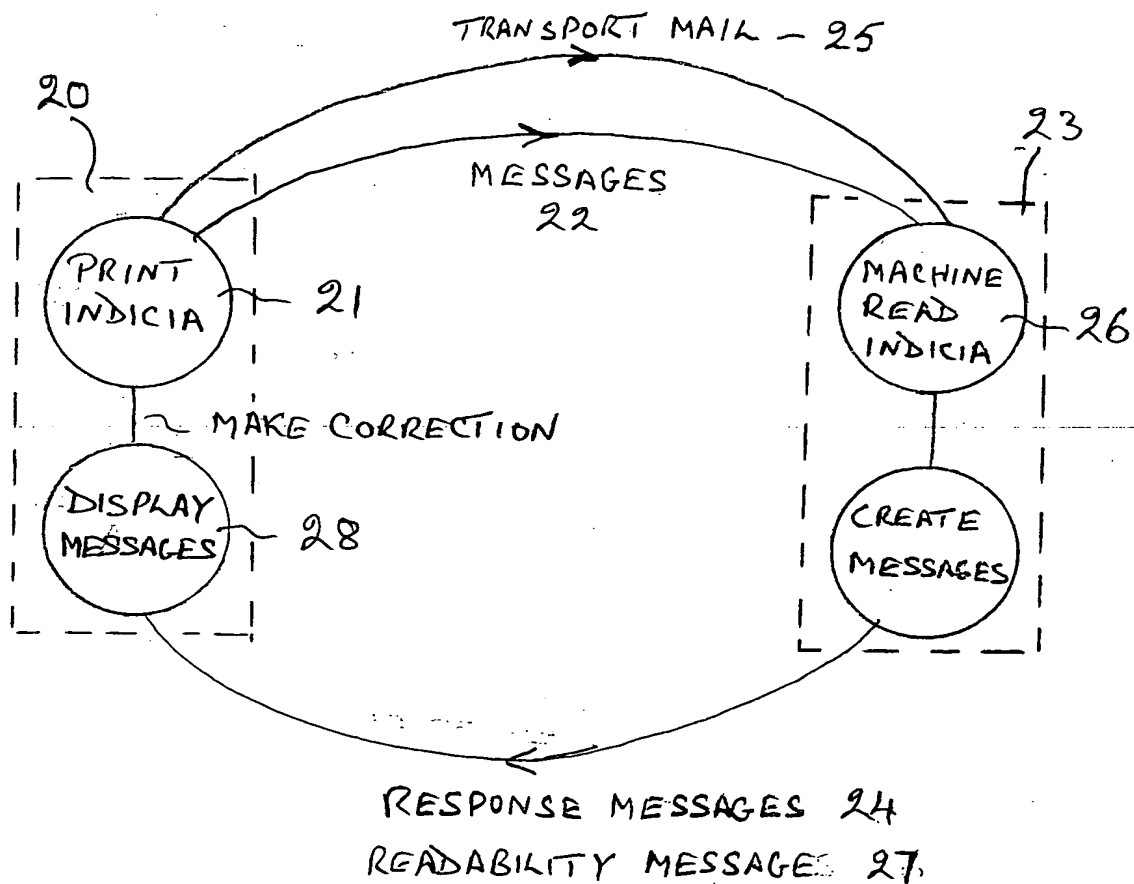
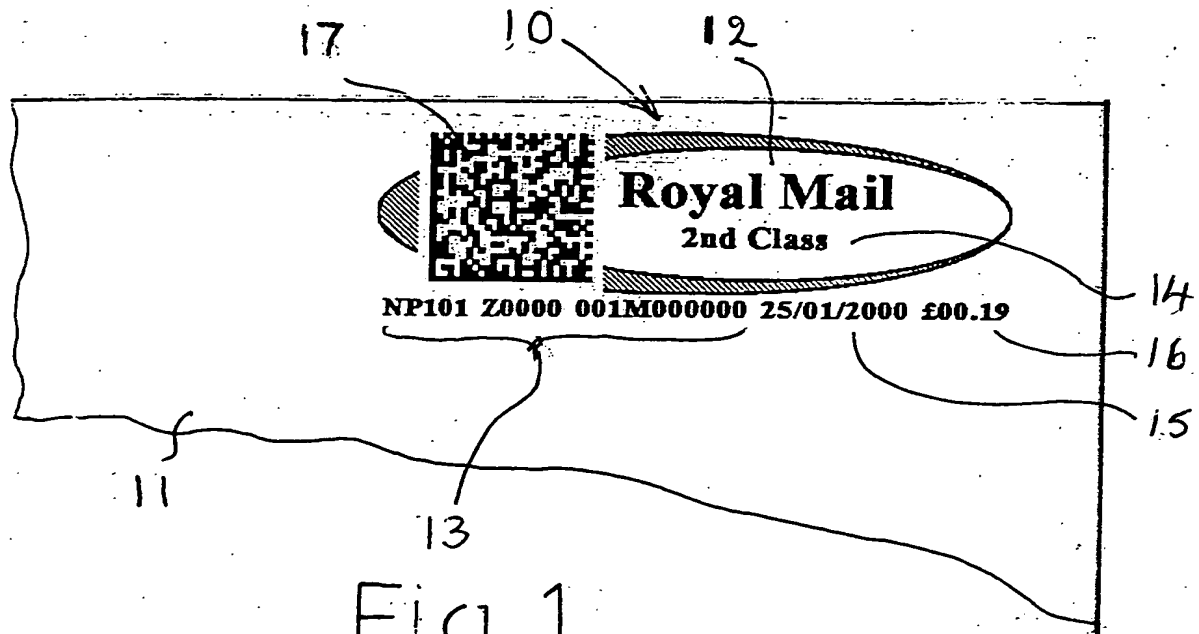
the readability of the printed symbol is advantageous in that operational characteristics of the machine reading equipment are taken into account in determining the readability of the printed symbols and the system together
5 with the operator provides a closed loop print control system.

The machine reading equipment may take further actions in determining the readability of imprints on mail items or
10 other articles. Prior to sending a readability message, the reading equipment may carry out a verification check against known standards, particularly if the reading equipment determines that the readability of a batch of mail is poor. If desired the readability of known
15 standards may be determined periodically by the reading equipment, for example on a daily or other time basis or based on the number of reading operations performed by the reading equipment, in order to verify that the reading equipment is operating correctly.

20 While the embodiment of the invention described hereinbefore relates to mail preparation and handling it will be appreciated that the print quality control system may be utilised in other fields for checking the machine
25 readability of imprints applied to articles other than mail items.

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